

in 1903, and the gold medal of the Royal Astronomical Society a second time in 1908.

No biographical notice of Sir David Gill would be complete without some reference to his striking personality. His force of character enabled him to triumph over difficulties and carry out great projects. His enthusiasm and tenacity of purpose communicated themselves to his colleagues and assistants, and supported them and him in the arduous details inseparable from astronomical enterprise. But he never lost in these details a clear view of the ultimate purpose of his work. As an astronomical observer he was unsurpassed, the pleasure of making every measurement as accurately as he was able counterbalancing the tedium of making observations of similar character night after night. His engineering skill stood him in good stead, and the perfecting of his instruments was a constant source of delight to him. His administrative success was due in large measure to the confidence he inspired in his staff, and their regard for him both as an astronomer and as a friend.

His health had been excellent since his return to London, and his large circle of friends hoped that he would be with them for many years. He was suddenly seized with pneumonia in December, 1913, and passed away on January 24, after an illness of six weeks. We tender to Lady Gill our respectful sympathy in her sudden bereavement.

F. W. D.

Sir David Gill was laid to his rest on Wednesday, January 28, the funeral being at St. Machar Cathedral, Aberdeen. A memorial service was held at St. Mary Abbot's, Kensington, and was attended by a large number of personal friends as well as representatives of institutions of science and learning, among the latter being:—Prof. Forbes (Edinburgh University), Sir William Crookes and Sir Archibald Geikie (Royal Society), Sir Norman Lockyer (British Science Guild), Lady Lockyer (the Hill Observatory, Salcombe-Regis), Dr. F. W. Dyson, Astronomer Royal, Major E. H. Hills (Royal Astronomical Society), Colonel E. E. Markwick (British Astronomical Association), Prof. H. H. Turner (Oxford University, and, with Major MacMahon and Mr. O. J. R. Howarth, the British Association), Mr. H. F. Newall (Cambridge University), Major Leonard Darwin (Royal Geographical Society), Dr. R. T. Glazebrook (National Physical Laboratory and Optical Society), Dr. W. N. Shaw (Meteorological Office), Dr. P. H. Cowell (Nautical Almanac Office), M. Jules Baillaud (representing the director of the Paris Observatory), Dr. A. E. H. Tutton (Mineralogical Society), Mr. W. H. Low (Cape Town Caledonian Society), Captain Lyons (the Science Museum), and Prof. Kapteyn (Groningen University).

DR. R. T. OMOND.

THE death of Dr. R. T. Omond at his house in Edinburgh on the morning of January 27 removes from us one whose name will be permanently associated with the famous Ben Nevis Observatory. Under his direct superintendence on that cloud-capped summit, hourly observations of the important meteorological elements were taken night and day for about ten years following 1884;

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and although his health prevented him doing the observational work for the remaining ten years of the great experiment, his whole mind was given to the completion of the undertaking. He continued as honorary superintendent; and devoted his time and energies to the reduction and discussion of the wealth of observations which had accumulated.

Dr. Omond was associated with Dr. Alexander Buchan in the preparation of the earlier of the four quarto volumes (Trans. R.S.E., vols. 36, 42, 43, 44) in which the observations are tabulated; but of the later volumes he had necessarily sole charge, and from the very beginning, indeed, the main labour of tabulation and proof correction rested with him. In addition to the tabulated observations of pressure, temperature, humidity, wind, rain, snow, &c., these volumes contain discussions and papers on various meteorological questions. There is also reproduced in detail the daily log-book of the observers, a fascinating and suggestive scientific document, containing, *inter alia*, descriptions of halos, glories, and coronæ, on which Omond himself contributed two papers to the Royal Society of Edinburgh. His principal scientific papers are published in the Ben Nevis volumes already mentioned, and in the *Journal of the Scottish Meteorological Society*.

Dr. Omond was educated at the Edinburgh Collegiate and at the University of Edinburgh. He did not follow any of the ordinary courses qualifying for degrees, but devoted himself mainly to study of physics under Prof. Tait; and to geology under Sir Archibald Geikie. He was, indeed, Tait's right-hand man in the investigations on the compressibility of fluids which arose out of the testing of the *Challenger* thermometers. He became a Fellow of the Royal Society of Edinburgh in 1884, was awarded the Keith Prize in 1892 for his Ben Nevis work, and served one term (1901-4) on the Council. The University of Edinburgh conferred on him the honorary degree of Doctor of Laws at the summer graduation of 1913. Hampered though he was latterly by a serious malady, he put through an immense amount of work, and retained to the end the bright, cheerful, unselfish spirit which endeared him to his many friends.

C. G. KNOTT.

NOTES.

WE record with much regret the death, on February 1, in his eighty-fourth year, of Dr. Albert Günther, F.R.S., formerly keeper of the zoological department of the British Museum (Natural History).

THE Postmaster-General has appointed a Committee to inquire into systems of high-speed telegraphy and to report thereon. The Committee will consist of Captain Norton, M.P., Assistant Postmaster-General (chairman), Sir John Gavey, C.B., Mr. J. Lee, Mr. W. M. Mordey, Mr. A. M. Ogilvie, C.B., Mr. W. Slingo, and Mr. A. B. Walkley. Anyone desirous of giving evidence before the Committee should com-

municate with Mr. G. O. Wood, Secretary's Office, G.P.O., who has been appointed secretary to the Committee.

A REUTER message from New York states that the Aéro Club has sanctioned a round-the-world aéroplane race, starting from the San Francisco Exhibition in May, 1915, and ending at the same place within ninety days. The first prize will be 20,000*l.* The race will be open to any type of motor-driven aircraft and will be under the auspices of the exhibition and the Pacific Aéro Club. It is announced that 30,000*l.* has already been subscribed, and that it is expected that an additional sum will be secured, all of which will be divided among the competitors.

It has been decided to prepare for publication a biography of the late Sir William H. White, K.C.B., the eminent naval constructor. Mr. J. B. Capper, to whom the work has been entrusted, will be grateful for any material in the shape either of correspondence or of reminiscence throwing light upon Sir William White's personality or work. Letters will be carefully preserved, copied, and returned. Communications of all kinds should be addressed to Mr. Capper, care of Sir Henry Trueman Wood, secretary of the Royal Society of Arts, John Street, Adelphi, London, W.C.

An address delivered by Mr. T. A. Jaggar, jun., at a meeting of the Hawaiian Volcano Research Association in Honolulu last December, has been published as a special bulletin of the Hawaiian Volcano Observatory. The address gives a detailed account of the nature and value of the scientific work done at the observatory. We notice that eleven investigators of note have been at Kilauea in the last five years, and have produced four important memoirs, many smaller papers, and a topographic map. A large realistic model of Kilauea is in preparation for the Agassiz Museum of Harvard University; and chemical analyses have been completed in Washington. In 1909 the late Dr. Tempest Anderson was in Hawaii, and secured many photographs. He presented the observatory with one of his ingenious cameras and a battery of three fine lenses. It is hoped, said Mr. Jaggar, that British friends will honour Dr. Anderson's memory by the establishment on St. Vincent, in the Caribbee Islands, of a permanent observatory and laboratory, for the study of the Caribbean volcanoes. This was his field of specially distinguished work in 1902.

THE Journal of the College of Science of the Imperial University of Tokyo was launched in 1887, and the Committee of Publication has recently issued a general index to vols. i. to xxv. (1887-1908). In this index there are fully 300 distinct contributions from about a gross of contributors, of whom twelve are Europeans and Americans. This gives some indication of the scientific activity of the Japanese, for all the contributions are of the nature of research. Every science is represented—mathematics, physics, chemistry, geology, mineralogy, zoology, botany, embryology, seismology, &c. The great majority of the papers are written in English, about two dozen being

in German, a few in French, and three or four of the lists of plants in Latin. Many of the memoirs are recognised by those competent to judge as of first-class importance in the development of scientific knowledge. When it is remembered that the papers are to a large extent the result of research work by the teachers, students, and graduates of the College of Science, and in many cases of work done within its walls, the world will recognise that Japan is rapidly repaying her debt to the West, from whom she received her first impulse towards scientific investigation.

ATTENTION was directed in the issue of NATURE for March 6, 1913 (vol. xci., p. 20), to the Napier tercentenary celebration, to be held in Edinburgh on Friday, July 24 next, and following days. The celebration is being held under the auspices of the Royal Society of Edinburgh, on whose invitation a general committee has been formed, representing the Royal Society of London, the Royal Astronomical Society, the Universities of St. Andrews, Glasgow, Aberdeen, and Edinburgh, the University College of Dundee, and many other bodies and institutions of educational importance. The Royal Society of Edinburgh now gives a general invitation to mathematicians and others interested in this coming celebration. The celebration will be opened with an inaugural address by Lord Moulton of Bank, followed by a reception given by the Lord Provost, magistrates, and council of the city of Edinburgh. The historical and present practice of computation and other developments closely connected with Napier's discoveries and inventions will be discussed on the following days. Relics of Napier will also be on view, and it is intended to bring together for exhibition books of tables and forms of calculating machines, which may reasonably be regarded as natural developments of the great advance made by Napier. Individuals, societies, &c., may become founder members on payment of a minimum subscription of 2*l.*; and each founder member will receive a copy of the memorial volume, which will contain addresses and papers read before the congress, and other material of historic and scientific value. Ordinary subscribers attending the celebration may obtain copies of the memorial volume at a reduced price. Subscriptions and donations should be sent to the honorary treasurer, Mr. Adam Tait, Royal Bank of Scotland, St. Andrew Square, Edinburgh.

MR. J. C. DRUMMOND has been appointed assistant to the chemical department of the Research Institute of the Cancer Hospital (Free), Fulham Road, London, S.W.

At the annual meeting just held of the Zoological Society of New York, it was resolved to cable to the Zoological Society of London the following message: "That the Zoological Society of New York, having been largely instrumental in securing the passage of our national measures for the protection of the birds of the world, by preventing all importations for purposes of fashion or millinery, hereby extends its greetings to its fellow-members of the Zoological Society of London, and expresses the hope that the society, which represents the other great metropolis of the

world, will lend its unanimous support to the Hobhouse Bill, now before Parliament, which is designed to reinforce the protective measures passed by Congress. The effect of the American Bill has been instantaneous and widespread, and is now receiving unanimous support all over the United States. The very passage and enforcement of the Bill has created a sentiment for wild-life protection in many quarters where it did not exist before. The millinery trade has adapted itself to the new conditions, and the law is acknowledged to be most beneficial in its results."

WRITING on December 13, Prof. Ignazio Galli describes a series of sunset-glows which recall those of 1883-84. They were first observed in Rome on July 13, and continued without intermission, though with frequent variations in brightness, until the middle of December. Prof. Galli notices that on June 17, or about a month before their first appearance, there was a very violent explosion of the Asama-yama in central Japan, followed by others on June 20 and 26.

MR. E. O. WINSTEDT has done a piece of useful work by collecting in the Journal of the Gypsy Lore Society, new series, vol. vii., part i., all the references to gypsies in Tudor times recorded in the State Papers. They give, as he remarks, a picture of gypsy life when they travelled far and wide in large bands, some of the leaders of which bore names still well known. A band of 140 persons is recorded in Staffordshire in 1539; eighty in Berkshire, Oxfordshire, and Buckinghamshire in 1576, with a passport forged by a Cheshire schoolmaster. Active measures of repression were put in force by the authorities, an order of the Privy Council in 1542-3 directing certain persons "to avoyde the countrey off a certayne nombre off vagabondes going upp and downe in the name of Egiptians."

THE report of the bacteriologist, Prof. Ward Giltner, of the Michigan State Board of Agriculture for the year July 1, 1912-July 1, 1913, has been received. Soil problems bulk large in the record, and an extensive trial of a serum for hog-cholera is being made, more than 500,000 c.c. of the serum having been issued.

AMONG a collection of Antarctic seals and birds from South Georgia presented to the Scottish Zoological Park by Messrs. Salvesen and Co., Leith, the most interesting specimens are a couple of young elephant-seals, about 6 ft. in length, and a Weddell's seal. The latter is believed to be the first living example of its kind hitherto brought to Europe.

WITH reference to a paragraph in NATURE of December 16, 1913 (p. 457), Dr. W. D. Matthew writes to say that the so-called lions of the Rancho-la-Brea asphalt deposit are the extinct *Felis atrox bebbi*, and not pumas. The use of the term "lion" in this sense is to be deprecated, as it is commonly applied in America to the puma, while *F. atrox* appears to be as nearly related to the tiger as to the lion.

IN vol. xxxv (p. 252) of Notes from the Leyden Museum, Dr. J. H. Vernhout states that specimens of the limpet-like mollusc, *Siphonaria siphon*, have been

taken on the coast of Ceram attached to rocks of mica-schist by the apices of their shells, so as to resemble small cups. Such a mode of attachment, so far as the author could ascertain, appears to be unique in the case of limpet-like shells.

THE extinct mammal-like reptiles of South Africa and their relatives in other parts of the world, together with the strata in which their remains are embedded, form the subject of a well-illustrated article by Dr. R. Broom in *The American Museum Journal* for December, 1913. A feature on which the author lays special stress is the powerful development of the limbs in nearly all the members of the group. "How these have been evolved is a matter of doubt, but there can be little question that it was this strengthening and lengthening of the limbs that started the evolution which ultimately resulted in the formation of the warm-blooded mammals."

TO the first part of the "Bergens Museums Aarbok" for 1913 Mr. J. A. Grieg contributes an exhaustive article of 147 pages, illustrated with two plates, on the aquatic fauna of the Hardangerfjord, including both vertebrates and invertebrates. The second of the two plates is devoted to a life-size figure of the shell of a very large and much elongated form of the whelk (*Buccinum undatum*). In the second part is a systematic catalogue, by Mr. H. T. L. Schaanning, of the birds of Norway, with references to literature ranging from the year 1599 to 1912. The number of species recognised, inclusive of the great auk, is three hundred.

IN 1906 the late Dr. F. Ameghino described certain sharks' teeth from the Tertiaries of Patagonia as the representatives of a new generic type, *Carcharoides*, the name being given in allusion to the fact that these teeth have the sharply acuminate crowns characteristic of *Lamna*, associated with the serrated margins of those of *Carcharodon*. Teeth of a precisely similar nature from the Tertiaries of Victoria are described in *The Victorian Naturalist* for December, 1913 (vol. xxx., pp 142-3), by Mr. F. Chapman. The discovery is of interest as affording additional evidence of the close affinity between the Tertiary littoral faunas of Patagonia, New Zealand, and Australia, and thus lending support to the view that they inhabited different portions of a single sea-bed.

DR. ASAJIRO OKA, in the Journal of the College of Science, Tokyo (vol. xxxii.), describes a remarkable new Japanese compound Ascidian, to which he gives the name, *Cyathocormus mirabilis*. The form in question appears to be closely related to *Colella*, consisting of a "head" attached by a short stalk, but the head is hollow, with a wide terminal opening, so that the entire colony has the form of a goblet, in the wall of which a single layer of zooids are arranged in double longitudinal rows. The author proposes for the reception of his genus a new family, *Cyathocormidæ*, which he suggests may form a connecting link between the more ordinary *Asciadiacæ* and the aberrant, free-swimming *Pyrosoma*. He therefore considers it doubtful whether we are justified in separating *Pyrosoma* from other compound Ascidians, and

placing it along with *Salpa* and *Doliolum* in the Thaliacea, as has recently been done by Neumann and by Parker and Haswell.

It would be difficult to find a better example of the valuable work that can be accomplished by a local scientific society than is offered in the Transactions of the Norfolk and Norwich Naturalists' Society for 1912-13. The presidential address, by Mr. Robert Gurney, is concerned with "The Origin and Conditions of Existence of the Fauna of Fresh Water." He is of opinion that the fauna of the relict lakes of the world show that the isolation of marine fauna does not lead to any great accession to the fresh-water fauna. "It seems that the successful adaptation of a species to fresh water depends essentially on a physiological variation of the organism, without which the most favourable external conditions are powerless to assist immigration." Next comes a very careful, complete, and well-illustrated monograph, by Prof. Oliver and Dr. Salisbury, on the topography and vegetation of Blakeney Point, that hunting ground of naturalists, which has now been brought under the National Trust as a nature reserve. It is followed by Mr. A. Preston's notes on the great flood of August, 1912, which was of such disaster to Norwich. Then comes a very valuable instalment of Mr. C. Morley's "Fauna and Flora of Norfolk." Other shorter papers, well worth study, include those on the growing of wild rice in East Norfolk, on the migrations of birds from Lowestoft and district, and on the record results of the Yarmouth herring fishery of 1912. Altogether, these Transactions do honour to a great society of natural history, in a county favoured by nature and famous in science. Dr. Sydney Long, the hon. secretary of the society, is to be congratulated on the care with which he has edited this collection of monographs.

"THE Geology and Mineralogy of Tin" are the subjects of a bibliography of 1701 entries, accompanied by an index of 167 pages, prepared for the Smithsonian Institution by F. L. and Eva Hess (Miscell. Collections, vol. lviii., No. 2). Since a brief account of the contents of almost all the papers is supplied, this publication will form a standard work of reference. It does not profess to be complete as regards works on the extraction and treatment of the ores, and hence we miss a reference to the ingenious test for cassiterite with hydrochloric acid and zinc, put forward, we believe, in West Australia in 1908.

DR. JOHN BALL, in Paper No. 29 of the Survey Department of Egypt (1913) describes the topography and geology of the phosphate deposits of Safâga. The district lies about 400 kilometres south-south-east of Suez, near the Red Sea. The phosphate deposits occur on either side of the Wadi Safâga at distances of from twelve to twenty-two kilometres inland. The phosphatic series consists of laminated grey clays with beds of calcareous phosphate and chert, lying between Upper Cretaceous limestones above and Nubian Sandstone below. There are three principal phosphate beds, all in the upper part of the series. These beds range from $1\frac{1}{2}$ to 2

metres in thickness, and carry from 20 to 75 per cent. of tricalcic phosphate. The bulk of the phosphatic matter is in the form of loosely agglomerated phosphatic grit, which may have been derived from the breaking up of shells, the calcium carbonate of which has been partially converted to calcium phosphate by the action of soluble phosphate from the decomposition of the soft portions of sharks the teeth of which occur very abundantly. The phosphate content may have been raised subsequently by the leaching out of some of the calcium carbonate. The origin of the chert has not yet been ascertained. The deposits are being worked at the Um el Huetat mines by the Egyptian Phosphate Company.

THE seventeenth *Rapport sur les variations périodiques des Glaciers* (*Zeitschrift für Gletscherkunde*, Band vii., Heft 1, p. 1) was published in September, 1912, with some unavoidable omissions. The supplement now added, Band vii. (1913), pp. 191-202, gives the information which had not then been received. It includes the glaciers on the north side of the Mont Blanc massif, those of the Maurienne, the Tarentaise, and Dauphiné, the Caucasus, the Altai, and North America, chiefly Alaska. In the first region two, Des Bossons and Du Tour, show a marked advance, another one is stationary, and the fourth observed is slightly retreating. Those in the other regions are either stationary or showing slight oscillations, or are still retreating, though not rapidly. The eighteenth *Rapport*, recently published (Band viii., p. 42), shows that, though the cold summer of 1912 has produced some effect, this is local, and comparatively small. Thus the information, as a whole, does not affect the conclusion to which that already received distinctly pointed, namely that the period of retreat, which has now lasted (at any rate in the Alps) for half a century, has not yielded generally, as might have been anticipated, to one of advance. The eighteenth *Rapport* includes the Pyrenees, where the glaciers mostly show signs of advancing, Norway, where the majority are receding, and North America, of which this is also true. Here the retreat is in some cases considerable, notably in that of the Grand Pacific Glacier, which has gone back 25 kilometres in thirty-three years. Besides these, the number contains some notes on Greenland glaciers, which, though necessarily incomplete, are interesting. They also show that the ice has receded in recent years.

WE have received a copy of the U.S. Daily Weather Map for January 1, with the announcement that from that date the U.S. Weather Bureau began the publication at Washington of a weather map of the northern hemisphere, which will be printed on the reverse side of the usual morning weather chart. Although the number of reports is limited at present, and the observations are not all strictly simultaneous, the essential features of atmospheric circulation over that hemisphere are fairly well shown. Prof. Marvin points out that in the latter publication the rational units of the c.g.s. system are adopted; pressures are expressed in millibars (1000 millibars=29.53 in.), and temperatures in absolute units (the temperature on the Centigrade scale

increased by 273), on the ground that mathematical and dynamic studies of the motions of the atmosphere are possible only when such rational units are employed. It will be remembered that these units are already used in some of our Meteorological Office publications, and that it is proposed to adopt them in others. Also that the Weekly Weather Report now contains small-scale daily charts, including practically the whole of the northern hemisphere, excepting Alaska and the North Pacific Ocean. The action taken by the Washington Bureau will be welcomed as matter of prime importance.

NEW paths of physical knowledge form the subject of an address to the University of Berlin delivered by Prof. Max Planck on his appointment as principal. The address deals with the conservation of matter, space, and time, and the quantum hypothesis; it is printed by the Norddeutscher Buchdruckerei, S.W., Wilhelmstrasse, Berlin.

AN article by Mr. Charles Bright in the January number of *The Quarterly Review* discusses the question of inter-Imperial telegraphy, and the advantages and disadvantages of cable telegraphy as opposed to wireless telegraphy. Whilst in favour of the State taking over control of the Imperial wireless telegraph scheme (Mr. Bright advocated this many years ago), it is pointed out that an inter-Imperial telegraph system would be the most advantageous. The route suggested is from Blacksod Bay, on the west coast of Ireland, to Halifax (N.S.), with an intermediate station at Cape Bauld (Newfoundland), and a branch cable up the Gulf of St. Lawrence towards Montreal. The cost of this line is estimated to be 500,000*l.*, and should be borne by the Empire as a whole. Having laid the Imperial Atlantic cable, it is suggested that the gaps should be filled up in order to complete an all-British cable chain between the Mother Country and her outlying possessions. Attention is directed to the fact that all the existing Atlantic cables are in foreign hands, and it is recommended that steps should be taken to remedy this state of affairs, which, it is argued, would be extremely prejudicial to the British nation in the event of international disputes. It is maintained that a cable has an advantage over wireless telegraphy in its greater secrecy and effective working speed owing to the far less repetition involved, and also owing to its freedom from interruption from "atmospherics," which are still a source of trouble in all wireless work.

IN two papers published in *The Biochemical Bulletin*, vol. iii., No. 9, by Dr. Clayton S. Smith and Messrs. W. A. Perlzweig and William J. Gies respectively, the question of the inhibition of change in fish by cold storage is dealt with. It is shown that bacterial and chemical action can be entirely prevented by efficient cold storage, and that even after two years of such storage practically no change can be detected by chemical means in the nutritive value of the fish or in its taste or palatability.

THE January number of *The Popular Science Monthly* contains an article by Prof. Cyril G. Hopkins on the Illinois system of permanent fertility. In this

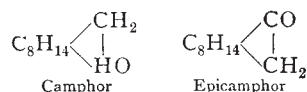
system no potash is added to the soil in the form of purchased fertiliser, but provision is made for the liberation of the necessary quantity from the soil by the action of decaying organic matter ploughed under in the form of farm manure or crop residues, including clover or other legumes. Ground natural limestone is added when needed. Phosphorus is supplied in the form of ground rock phosphate, at least 1000 lb. per acre being added every four years. Special rotations are arranged to suit the case, either of the livestock farmer or the grain producer, so as to maintain the nitrogen fertility at a maximum. Articles on the present status of cancer research, by Dr. Leo Loeb, and the mechanism of heredity, by Prof. T. H. Morgan, discuss problems which are of general interest.

A PAPER on amalgams containing silver and tin, by Messrs. Knight and Joyner, which appears in the Chemical Society's Journal (December, 1913), is of special interest in view of the widespread use of these amalgams in dentistry. Although solid solutions may be present in large proportions at higher temperatures, these disappear almost entirely below 70°, and the process of amalgamation at room-temperature is substantially that represented by the equation:—

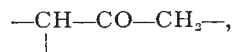


The curious "ageing," by annealing at 100°, which reduces to less than one-half the amount of mercury taken up by the freshly prepared filings of the silver-tin alloy has been further studied. It has been shown that it is not due to oxidation, and that it is accompanied by a change of density, but the real nature of the process is still obscure.

THE Chemical Society's Journal for December, 1913, contains an important monograph by Profs. Bredt and Perkin on epicamphor. This substance, which is related very closely to camphor,



differs from it mainly in that the carbonyl group is contiguous to hydrogen on both sides,



instead of $\text{—C(CH}_3\text{)—CO—CH}_2\text{—}$, and might be expected to produce greater activity in the molecule.

Nevertheless it refuses to combine with hydrogen cyanide and brominates in much the same way as camphor itself. The physiological effects of epicamphor are vastly inferior to those of camphor; a favourable effect on the beat of the heart does not become apparent until the dose is four times stronger than in the case of camphor, and even then the effects produced are very transient.

MR. A. P. THURSTON gives an account in *Engineering* for January 30 of some experiments carried out by him at the East London College on the resistance of bars, struts, and wires in a current of air. Part of this research was the investigation of the shielding effect of one bar mounted in the direct path of

another bar of identical length, shape, and size. The total resistance when the two bars are in contact is about three-quarters the resistance of one bar alone. As the gap is increased, there is at first a small decrease in the resistance. With a gap equal to the thickness of one bar, the total resistance is the same as when the bars are in contact, and becomes equal to the resistance of one bar alone when the gap is twice the thickness of one bar. With a gap of sixteen times the thickness, the total resistance is only 5 per cent. less than double the resistance of the single bar. It would appear from these experiments that the total resistance of struts, following in the same run of air and more than thirty times the thickness apart, may be assumed to be the same as the total resistance of the separate struts in a clear run of air.

THE Vesterling Organisation Company, Clapham Junction, London, S.W., manufactures a convenient loose-leaf book, which has certain novel characteristics. By the use of a patent device in the back of the book it opens flat at any place. Specially made rings render the filing of new papers, or removal of old, simple and quick. The book will prove of real assistance to lecturers who use copious notes, and to all who have to preserve loose papers in a way which makes ready reference easy.

A 1914 supplement to their "General Apparatus Catalogue, 1910," has been issued by Messrs. Heynes Mathew, Ltd., of Cape Town. The new list of apparatus affords an instructive illustration of recent progress in South African education. The improved methods of teaching geography which have become established in this country, for example, are being taken up in South African schools, and a demand for material for lessons in practical geography is met by a section in the new catalogue being devoted to this subject. Similarly this firm is prepared to supply equipment for practical work in botany and other branches of science.

OUR ASTRONOMICAL COLUMN.

PLANETARY OBSERVATIONS AT THE LOWELL OBSERVATORY.—In *Astronomische Nachrichten*, No. 4710, a telegram is published from Prof. Lowell relating to observations on the satellites of Saturn and on Martian features. With regard to the former it is stated, "Tethys and Dione variable, range quarter magnitudes, periods coincident with revolution." Relating to the latter, the telegram says:—"The full aperture of the 40-in. reflector of the Lowell Observatory only now equipped for visible work shows the canals of Mars as fine direct geometrical lines, thus corroborating the work of smaller apertures. This should dispose of the erroneous idea that [such] apertures do not disclose these remarkable features."

WAVE-LENGTHS OF CHROMOSPHERIC LINES.—It was known soon after the event of the total solar eclipse of August 30, 1905, that Prof. S. A. Mitchell, who was in charge of the numerous spectroscopic instruments which were employed in the United States Naval Observatory eclipse expedition, had secured some most excellent photographs of the spectrum of the chromosphere. It is not until now, however, that

the results of their reduction are published, and these are printed in the current number of *The Astrophysical Journal* (December 1913). The photographs discussed were secured with gratings, both parabolic and plane, and the present paper deals with the reduction of one photograph from each instrument for the purpose of giving chromospheric wave-lengths, intensities, &c., "with as great an accuracy as possible." This communication is finely illustrated with plates showing different portions of the photographs, and they are demonstrative of the very fine adjustment of the instrument during use. A very long table shows the wave-lengths compared with Rowland, and the heights of the chromospheric lines, the corresponding elements and intensities according to Rowland, chromosphere, arc, and spark. No fewer than 2841 lines are tabulated in the chromospheric spectrum, and this above many faint lines which were measured; no lines were included unless they were measured in two or more separate measurements. The paper is full of many interesting summaries of these chromospheric lines arranged according to elements, atomic weights, &c. The conclusions arrived at are important, but it is impossible to repeat them all here. Some of them are as follows:—The "flash" spectrum is a reversal of the Fraunhofer spectrum. The "flash" is not an instantaneous appearance, but the chromospheric lines appear gradually, the highest layers first, the lowest last. The "reversing layer," which contains the majority of the low-level lines of the chromosphere, is about 600 km. in height. Wave-lengths in chromospheric and solar spectra are practically identical, the chromospheric spectrum differing greatly from the solar spectrum in the intensities of the lines. The differences of intensity find a ready explanation in the heights to which the vapours ascend. The enhanced lines are especially prominent in the chromosphere, and these are said to become brighter mainly because at the heights to which they ascend the vapours are mixed with hydrogen at reduced pressure.

THE ANNUAL OF THE BUREAU DES LONGITUDES.—The annual published by the Bureau des Longitudes is familiar to all readers of this column, and the present issue for 1914 will no doubt be found as useful for reference as its predecessors. In addition to the usual astronomical, physical, and chemical data embodied in these small pages, will be found articles of astronomical interest. Thus M. Deslandres gives a *résumé* of solar physics, M. P. Hatt contributes a short article on the deformation of images in telescopes, while M. G. Bigourdan writes very fully on the day and its subdivisions, the hour-zones and the international association of the hour. The seventeenth meeting of the International Geodetic Association is described by M. B. Baillaud.

WHAT IS PSYCHO-ANALYSIS?

PERHAPS the most important and startling scientific theory of modern times is that which Prof. Sigmund Freud, of Vienna, has formed to explain the workings of the human mind. Many thinkers, indeed, hail Freud as the Darwin of the mind, and consider that his views are destined to transform the science of psychology. He certainly has succeeded in explaining such obscure and widely differing phenomena as dreams, wit, the seemingly accidental mistakes in speaking and writing which people so often make, the obsessions and other symptoms found in a large class of mental diseases, and the spontaneous likes and dislikes which we all experience and find so puzzling, in terms of one single hypothesis. Put quite briefly, this is the hypothesis of "the unconscious mind," something quite distinct